[0025] FIG. **2**A is a sectional view of a single FEGV airfoil;

[0026] FIG. **2**B is a sectional view of the FEGV illustrated in FIG. **2**A shown in a first position;

[0027] FIG. **2**C is a sectional view of the FEGV illustrated in FIG. **2**A shown in a rotated position;

[0028] FIG. **3**A is a sectional view of another embodiment of a single FEGV airfoil;

[0029] FIG. **3**B is a sectional view of the FEGV illustrated in FIG. **3**A shown in a first position;

[0030] FIG. **3**C is a sectional view of the FEGV illustrated in FIG. **3**A shown in a rotated position;

[0031] FIG. **4**A is a sectional view of another embodiment of a single FEGV slatted airfoil with a;

[0032] FIG. **4**B is a sectional view of the FEGV illustrated in FIG. **4**A shown in a first position; and

[0033] FIG. **4**C is a sectional view of the FEGV illustrated in FIG. **4**A shown in a rotated position.

DETAILED DESCRIPTION

[0034] FIG. **1** illustrates a general partial fragmentary schematic view of a gas turbofan engine **10** suspended from an engine pylon P within an engine nacelle assembly N as is typical of an aircraft designed for subsonic operation.

[0035] The turbofan engine **10** includes a core section within a core nacelle **12** that houses a low spool **14** and high spool **24**. The low spool **14** includes a low pressure compressor **16** and low pressure turbine **18**. The low spool **14** drives a fan section **20** directly or through a gear train **22**. The high spool **24** includes a high pressure compressor **26** and high pressure turbine **28**. A combustor **30** is arranged between the high pressure compressor **26** and high pressure turbine **28**. The low and high spools **14**, **24** rotate about an engine axis of rotation A.

[0036] The engine **10** in the disclosed embodiment is a high-bypass geared turbofan aircraft engine in which the engine **10** bypass ratio is greater than ten (10), the turbofan diameter is significantly larger than that of the low pressure compressor **16**, and the low pressure turbine **18** has a pressure, or expansion, ratio greater than five (5). The gear train **22** may be an epicycle gear train such as a planetary gear system or other gear system with a gear reduction ratio of greater than 2.5. It should be understood, however, that the above parameters are exemplary of only one geared turbofan engine and that the present invention is likewise applicable to other gas turbine engines including direct drive turbofans.

[0037] Airflow enters a fan nacelle **34**, which may at least partially surrounds the core nacelle **12**. The fan section **20** communicates airflow into the core nacelle **12** for compression by the low pressure compressor **16** and the high pressure compressor **26**. Core airflow compressed by the low pressure compressor **16** and the high pressure compressor **26** is mixed with the fuel in the combustor **30** then expanded over the high pressure turbine **28** and low pressure turbine **18**. The turbines **28**, **18** are coupled for rotation with respective spools **24**, **14** to rotationally drive the compressors **26**, **16** and, through the gear train **22**, the fan section **20** in response to the expansion. A core engine exhaust E exits the core nacelle **12** through a core nozzle **43** defined between the core nacelle **12** and a tail cone **32**.

[0038] A bypass flow path **40** is defined between the core nacelle **12** and the fan nacelle **34**. The engine **10** generates a high bypass flow arrangement with a bypass ratio in which approximately 80 percent of the airflow entering the fan nacelle **34** becomes bypass flow B. The bypass flow B communicates through the generally annular bypass flow path **40** and may be discharged from the engine **10** through a fan variable area nozzle (FVAN) **42** which defines a variable fan nozzle exit area **44** between the fan nacelle **34** and the core nacelle **12** at an aft segment **34**S of the fan nacelle **34** downstream of the fan section **20**.

[0039] Referring to FIG. **1**B, the core nacelle **12** is generally supported upon a core engine case structure **46**. A fan case structure **48** is defined about the core engine case structure **46** to support the fan nacelle **34**. The core engine case structure **46** is secured to the fan case **48** through a multiple of circumferentially spaced radially extending fan exit guide vanes (FEGV) **50**. The fan case structure **48**, the core engine case structure **46**, and the multiple of circumferentially spaced radially extending fan exit guide vanes **50** which extend therebetween is typically a complete unit often referred to as an intermediate case. It should be understood that the fan exit guide vanes **50** may be of various forms. The intermediate case structure in the disclosed embodiment includes a variable geometry fan exit guide vane (FEGV) system **36**.

[0040] Thrust is a function of density, velocity, and area. One or more of these parameters can be manipulated to vary the amount and direction of thrust provided by the bypass flow B. A significant amount of thrust is provided by the bypass flow B due to the high bypass ratio. The fan section **20** of the engine **10** is nominally designed for a particular flight condition—typically cruise at 0.8M and 35,000 feet.

[0041] As the fan section **20** is efficiently designed at a particular fixed stagger angle for an efficient cruise condition, the FEGV system **36** and/or the FVAN **42** is operated to adjust fan bypass air flow such that the angle of attack or incidence of the fan blades is maintained close to the design incidence for efficient engine operation at other flight conditions, such as landing and takeoff. The FEGV system **36** and/or the FVAN **42** may be adjusted to selectively adjust the pressure ratio of the bypass flow B in response to a controller C. For example, increased mass flow during windmill or engine-out, and spoiling thrust at landing. Furthermore, the FEGV system **36** will facilitate and in some instances replace the FVAN **42**, such as, for example, variable flow area is utilized to manage and optimize the fan operating lines which provides operability margin and allows the fan to be operated near peak efficiency which enables a low fan pressure-ratio and low fan tip speed design; and the variable area reduces noise by improving fan blade aerodynamics by varying blade incidence. The FEGV system **36** thereby provides optimized engine operation over a range of flight conditions with respect to performance and other operational parameters such as noise levels.

[0042] Referring to FIG. **2**A, each fan exit guide vane **50** includes a respective airfoil portion **52** defined by an outer airfoil wall surface **54** between the leading edge **56** and a trailing edge **58**. The outer airfoil wall **54** typically has a generally concave shaped portion forming a pressure side and a generally convex shaped portion forming a suction side. It should be understood that respective airfoil portion **52** defined by the outer airfoil wall surface **54** may be generally equivalent or separately tailored to optimize flow characteristics.

[0043] Each fan exit guide vane **50** is mounted about a vane longitudinal axis of rotation **60**. The vane axis of rotation **60** is typically transverse to the engine axis A, or at an angle to engine axis A. It should be understood that various support struts **61** or other such members may be located through the